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DEPARTMENT OF FISH AND GAME

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NIAGARA SPRINGS HATCHERY

Annual Report

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by
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NIAGARA SPRINGS HATCHERY

Annual Report

ABSTRACT

The Niagara Springs Hatchery is located ten miles south of Wendell, Idaho, in the Snake River Canyon. The hatchery is owned and financed by Idaho Power Company.

A gravity flow water source supplies the 80 to 110 cfs of 58 F water used for steelhead rearing.

In November of 1983, the hatchery transported 220,270 steelhead fingerlings weighing 15,300 pounds to the Snake River below Hells Canyon Dam. Smolt releases in Hells Canyon in April and May of 1984 were 408,430 fish weighing 93,700 pounds. In November of 1983, the hatchery also transported 228,800 steelhead fingerlings weighing 12,000 pounds to the Pahsimeroi River. In April of 1984, the hatchery released 752,195 steelhead smolts for a total of 189,000 pounds in the Pahsimeroi River.

Fish feed utilized by the Niagara Springs steelhead during the year was 635,400 pounds at a cost of $153,516.74.

The adipose fin was removed from all fish released this year. A total of 161,809 steelhead were coded wire tagged, and 21,623 steelhead were freeze branded for a study on out-migration timing.

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Fish Hatchery Superintendent III

OBJECTIVES

The objectives of the Niagara Springs Hatchery were:

1. To rear 200,000 pounds of steelhead smolts to be released into the Pahsimeroi River.

2. To eventually rear 200,000 pounds of steelhead smolts for release into the Snake River below Hells Canyon Dam.

The purpose of this project was to continue the program of relocation of Snake River steelhead to the Pahsimeroi River. The hatchery is continuing to maintain the steelhead run in the mid-Snake River below Hells Canyon Dam.

INTRODUCTION

The Niagara Springs Hatchery is located 10 miles south of Wendell, Idaho, in the Snake River Canyon. The hatchery is in Gooding County and is owned and financed by Idaho Power Company under their contract to produce steelhead for the lower Snake River and to relocate the original Snake River steelhead into the Pahsimeroi River, a tributary of the Salmon River.

The hatchery receives its water from Niagara Springs. These springs are also used by a commercial hatchery located to the hatchery's west and Pugmire Park, which is very heavily used by tourists. The Idaho Department of Fish and Game also takes water from this system to maintain a large ranch to the west of the station. The elevation in this area is 3,000 feet above sea level.

The operation of Niagara Springs Hatchery requires between 80 and 110 cfs. This system is all gravity flow. The water temperature is 58 F and is used for steelhead rearing, domestic water for homes and irrigation of 10 acres of lawn.

The hatchery has a 30' x 90' building which houses an office, two incubator rooms, a storage room, a small shop, a garage and three restrooms. A 12¹ x 35¹ building is used for storage. A chiller building is used to house a 20-ton freezing unit to chill water for hauling steelhead. The hatchery has three frame homes and a mobile home for housing its four permanent employees. The homes have three bedrooms and attached two-car garages. The trailer has three bedrooms and does not have a garage.

The hatchery has 14 raceways that are 10' wide x 300, long x 3'10" deep. Seven of these raceways are divided to accommodate rearing of fingerlings. The fingerling units are 15¹ long x 56" wide. Housed in the incubator rooms are 20 circular vats, 6, in diameter and 3¹ deep, for hatching eyed eggs.

There are 14 Nielsen fry feeders which are operated by a time clock and are used in fingerling rearing. There is a bridge with 14 Nielsen feeders used for feeding the fingerlings to smolt size. This bridge is powered by electricity and spans the 14 large raceways, allowing the crew to feed every raceway at one time.

FISH PRODUCTION

In the' spring of 1984, the Niagara Springs Hatchery received 2,333,760 eyed steelhead eggs from the Pahsimeroi Hatchery. Another 598,404 eyed steelhead eggs were received from the Oxbow Hatchery, which is located below Oxbow Dam on the Snake River. As of September 30, 1984, there were 2,584,667 steelhead fingerlings weighing 74,280 pounds remaining at this station.

In late November of 1983, we transported 220,270 steelhead fingerlings weighing 15,300 pounds to the Snake River below Hells Canyon Dam. Smolt releases to this site in April and May of 1984 were an additional 408,430 fish for a total poundage of 93,700.

Between November 16 and 20, 1983, the hatchery crew transported 228,800 steelhead fingerlings, weighing 12,000 pounds, to the Pahsimeroi River. In April, 1984, a total of 752,195 smolts weighing 189,000 pounds were planted at this same site.

Total smolt and fingerling releases for the 1983-84 fish year were 1,609,695 fish weighing 310,000 pounds. These steelhead were all "A" strain fish.

FISH HEALTH

The main concern this year was an outbreak of furunculosis in March, 1984. Medicated feed was administered for a 14-day period three weeks prior to smolt release. The fish had a typical sensitive reaction to the TM-50 and Sulfamerazine treatment. Mortality dropped to normal after the treatment, and the fish were in excellent health at planting.

There were a few minor outbreaks of gill problems in the fingerlings. These fish were treated with salt and Purina 4X in a one-hour flush. Mortality was minimal, and there was no recurrence after the initial treatment.

Viral tests were completed on all fish at approximately three-month intervals. There were no problems with virus in the fish in 1984, and all tests came back negative.

NUTRITION

Fish food utilized during the year totaled 635,400 pounds. The cost, including sales tax, was $153,516.74. This calculates out to 2.05 pounds of feed for each pound of fish flesh. The cost for each pound of fish produced was $0.495. Fish food was purchased from Murray Elevators, Rangens and Clear Springs.

MARKING

All the fish at Niagara Springs were marked by an adipose fin clip prior to release. The clipping was done by an eight-woman crew between late October and early December of 1983.

In the fall of 1983, 161,809 steelhead were coded-wire tagged by the same crew which did the adipose clips. These fish were released as smolts in the Pahsimeroi River.

Fred Partridge and a small crew freeze branded 21,623 steelhead, which were released at the Hells Canyon site. The purpose of branding was for smolt migration timing studies through the dam systems on the Snake and Columbia rivers.

SPECIAL STUDIES

Silver Cup Feed Study

In late May of 1984, a feed study was initiated to compare performance of Clear Springs dry trout diet with Silver Cup dry trout diet on steelhead at Niagara Springs Hatchery. The study continued for 19 weeks and yielded the following results:

> Silver Cup feed produced a lower conversion ratio, a lower cost per pound of gain and higher average daily length increase. There was also less time required in pond maintenance with Silver Cup feed.

In keeping with hatchery policy to continually upgrade the quality of our product and cost efficiency of our operation, it has been our practice to examine and compare various brand and formulations of fish feed. As research and technology continue to advance and availability of ingredients fluctuates, constant changes in feed occur. Since research and testing are geared to the primary user, rainbow trout, we have felt a need to conduct our own investigations to ensure the best interest of steelhead at Niagara Springs Hatchery.

Guidelines. For the past several years, Clear Springs dry trout diet, which is manufactured by Clear Springs Trout Company of Buhl, Idaho, has been used at Niagara Springs. This year the Clear Springs feed was compared with Silver Cup dry trout diet manufactured by Sterling H. Nelson and Sons of Murray, Utah. The comparison was run on two similar-aged sublots of A-strain steelhead from the Pahsimeroi River stock.

Both groups were started at a feeding rate commensurate to a hatchery constant of 10 and an average daily length increase of .026 inches per day, which is the five-year average for steelhead at this station. All of the fish were inventoried in mid-June by sample counts and weighing as they were transferred to outside raceways and again in October by actual count during the adipose clipping project. Each group was also sample counted at the end of each month. Growth and feeding rates were projected throughout each month based on these sample counts.

Silver Cup Study Group. The study group, comprised of 419,232 swim-up fry averaging .096 inches in length, were started on May 31 with Silver Cup starter mash. Feed was increased on a weekly basis according to the growth projections. Feed size was increased according to the schedule listed in Fish Hatchery Management (Piper et al. 1982). The study ran through October 9 (131 days) when feeding was discontinued in preparation for marking. Average length on that date was 4.149 inches.

A total of 12,764 pounds of feed was fed for a weight gain of 10,102 pounds at a cost of $3,503.17. This equates to a conversion ratio of 1.26 pounds of feed fed per pound of fish gained, at a cost of $0.347 per pound. Average daily length increase was .025 inches, and total mortality was 10,792 fish.

Control Group. The control group was 420,486 swim-up fry whose average length was .966 inches at the beginning of the comparison. Record keeping began on May 26. Their diet was Clear Springs #1, which is comparable in size and structure to the Silver Cup starter mash. Feed was calculated and fed in identical manner to the study group with weekly feed increases based on the same schedule. Records were kept on this group until October 10 (137 days) when their feed was also discontinued prior to fin clipping.

Average length at the end of the study period was 4.184 inches. The total feed fed was 13,292 pounds which yielded a weight gain of 9,351 pounds, at a cost of $3,553.97. The conversion ratio was 1.42 pounds of feed fed per pound of fish gained. Average daily length increase was .023 inches, and total mortality was 50,011 fish.

Table 1. Results of growth data for Clear Springs and Silver Cup feeds.

	Clear Springs	Silver Cup
Weight gain	9,351 pounds	10,102 pounds
Conversion ratio	1.42	1.26
Cost per lb. gain	$0.380	$0.347
Average daily length increase	.023	.025
Mortality	50,011	10,792

Comparison. It should be noted that both groups of fish were located in similar position to the water source and inflows were essentially the same. Pond cleaning, sample counting and other routine maintenance was performed in the same manner in both groups. In short, there were no apparent differences in the two groups except feed.

As the study progressed, two gross observations were made. First of all, the fish reared on Silver Cup diet appeared much darker in color than the control group. This was due to a darker colored algae that developed on the pond floor. Secondly, it was noted throughout the study that pond cleaning was easier in the study group. There was a visibly lesser amount of solid waste on the pond floor. The lower conversion ratio accounts for a portion of this reduction in waste, and it is supposed that the remainder is due to a difference in waste composition which may also explain the difference in algae growth. Nevertheless, it allowed better self-cleaning in the study group pond. In any case, less man-hours required for cleaning ponds and less effluent buildup between cleanings are both to the advantage of our operation.

As indicated by Table 1, some seemingly conclusive results were obtained. However, the comparison of mortality is not valid. Excessive losses were sustained in the control group during the fin clipping operation as a result of mechanical problems and inexperienced help. Because of the confusion involved at the time, exact natural mortality was uncertain. Consequently, the conversion ratio and unit production costs are slightly inflated. Nevertheless, the average daily length increase is a valid comparison.

Other factors which should be considered that were not covered by the study are availability of feed, service and reliability of the source, and feed quality so far as composition is concerned. Because of the size of the operation and the priority commitments to their own hatcheries, Clear Springs often had problems meeting our needs. The small quantities of sacked feed we required during the early stage of our production cycle was difficult for them to provide on a timely basis. Apparently, this was not a problem for Nelson and Sons. One question arises, however--can Nelson and Sons provide medicated feed on a timely basis? Fortunately, this question went unanswered as a result of good fish health during the study period.

As far as service and reliability were concerned, nothing conclusive was observed. There was a definite difference in the milling quality of the feed, particularly in the pelleted feed. It was noted that Silver Cup was superior to Clear Springs in firmness of pellets and lack of fines and feed dust. We actually had to send one load of Clear Springs bulk feed back.

Conclusion. The Silver Cup feed outperformed Clear Springs in most respects. Although the mortality comparison was not valid, all other comparisons lend themselves toward serious consideration of Silver Cup as a production feed at Niagara Springs. We still do not know if Silver Cup feed will produce a quality product at a better price and in a time frame compatible with spring releases and egg shipments. Assuming that higher growth rate is indicative of higher available nutrient levels, it would seem reasonable that Silver Cup feed offers more flexibility in speeding up or holding back fish growth. By using this flexibility in conjunction with periodic grading of fish, better control of growth would be gained. It would also show a reduction in cannibalism and size diversity which are inherent problems with steelhead culture.

After considering all factors, it is recommended that Silver Cup dry trout diet be used as a production feed for steelhead at the Niagara Springs Hatchery. More research should be done to determine optimum growth rates for reaching target size at the target date without sacrificing numbers or quality.

Initial Feeding Date Study

This study was proposed to determine latitude in the initial feeding dates of steelhead fry.

The control group of 104,940 fry were first fed at 50% swim-up, which occurred on the 13th day after hatch. One study group of 103,752 were first fed at 90% swim-up, which occurred on the 18th day after hatch. The second study group of 104,280 fry were fed at 90% button-up.

Although the final write-up is not yet completed, the preliminary results indicate no adverse affects from holding back the initial feeding. Instead, a reduced mortality was indicated. This may be due to reduced loss as a result of damaged sac fry that remain on the bottom of the vat during cleaning.

Another apparent conclusion of this study is that by holding fish off feed until a higher percentage of fry are up, a more uniform size of fish is attained by reducing the number of fish that get a two to three day jump on the others. Also, the study suggests a possible reduction in cannibalism.

Shade Study

An experiment with shading ponds after fry are moved outside was proposed, but timing and manpower did not allow sufficient time to set it up. We feel confident that early losses can be reduced with shading and would like to run this study on the next year class.

MISCELLANEOUS ACTIVITIES

We had 65,187 visitors counted through Pugmire Park in 1983 and 72,161 in 1984. Most of these visitors toured the hatchery. The hatchery crew gave tours to local church and school groups and to families in the area who had relatives visiting from other states.

The crew assisted in fish and game law enforcement, check stations and other functions that were required.

Paul Abbott was assigned to Lower Granite Dam from March 22 to July 1, 1984. He observed and assisted in the smolt collection and transportation operation conducted by the U.S. Army Corps of Engineers, the National Marine Fisheries and N.O.A.A.

IMPROVEMENTS

A new vapor light was installed above the chiller building. This has been a very helpful aid in early morning and late evening fish tanker loading.

Residence #1 received new carpet and linoleum throughout.

A new three-inch vacuum pump was purchased for cleaning our effluent pond and our 14 large raceways.

NEEDS

We need to update the fish pump with a dewatering tower and grader. This will help considerably in increasing poundage production and loading of steelhead for transport.

A concrete dam is needed at the intake system. This would eliminate removing and replacing the dirt dam now being used. It would also help to control flow needs through the hatchery at different times during the growing season.

The cleanways on the east and west sides of the large raceways need to be tied into the effluent discharge system to the settling pond. This will help with raceway vacuuming and keep hatchery waste from going into Niagara Springs Creek.

The 2x4 dam boards in the sections of all the raceways should be replaced with 2x8 dam boards.

The center walls of our large raceways used for fry and fingerling rearing should be extended to 50 feet. This will increase the nursery raceways to a reliable size for starting our steelhead.

Settling pond cleaning needs to be improved. We need a loader and a dump truck every two years to completely clean this system. Pumping it out with a three-inch pump is impractical.

A new system is needed for raceway cleaning. The pipe system now in use is not large enough to carry the flows utilized during the last five months of the growing season. This would greatly improve compliance with the required EPA standards.

A garage is needed for Residence #4. This facility has no protection for a private vehicle.

Another storage shed is needed for housing the fish pump and other equipment used in the hatchery operation.

ACKNOWLEDGEMENTS

We had a large turnover of personnel at this station in 1984. Superintendent Charles Quidor retired in May and was replaced by Jerry Mowery. Steve Dillon filled the Superintendent I position in December, 1983. Dave May moved to Hagerman State Hatchery, and a new fish culturist, Mike Stoddard, filled this position. Paul Abbott remained as fish culturist most of this season.

We wish to thank Idaho Power's Hagerman shop crew for all their help on bridge maintenance, intake dam replacements, electrical work on housing and the chiller building and numerous other chores that were accomplished by them.

We wish to thank Larry Wimer for all his expertise and help with fish feed problems, access problems, purchasing problems and many other items which arose during the year.